FIG. 1

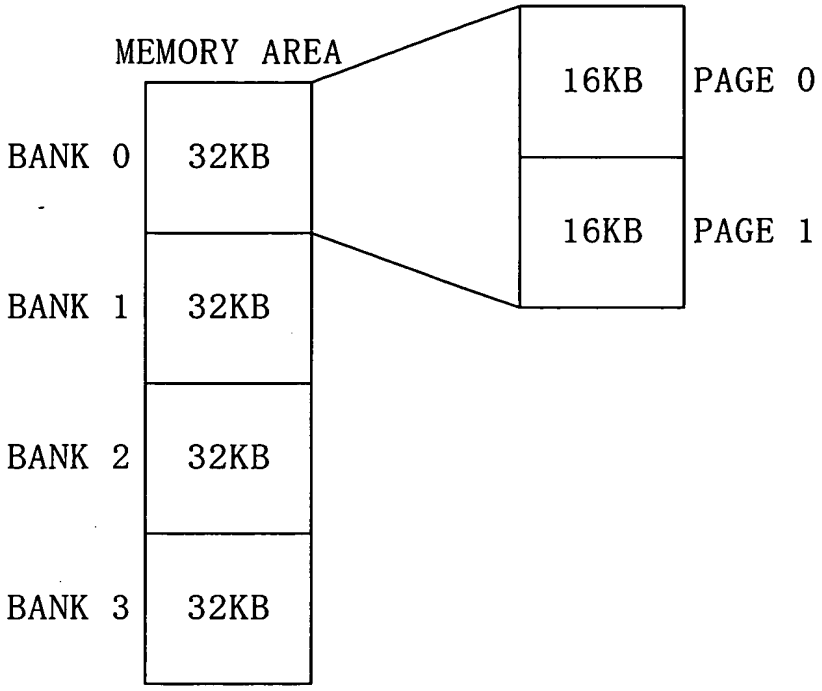

MEMORY AREA
BANK 0
32KB
BANK 1
32KB
BANK 2
32KB
BANK 3
32KB
16KB
PAGE 0
16KB
PAGE 1

FIG. 2

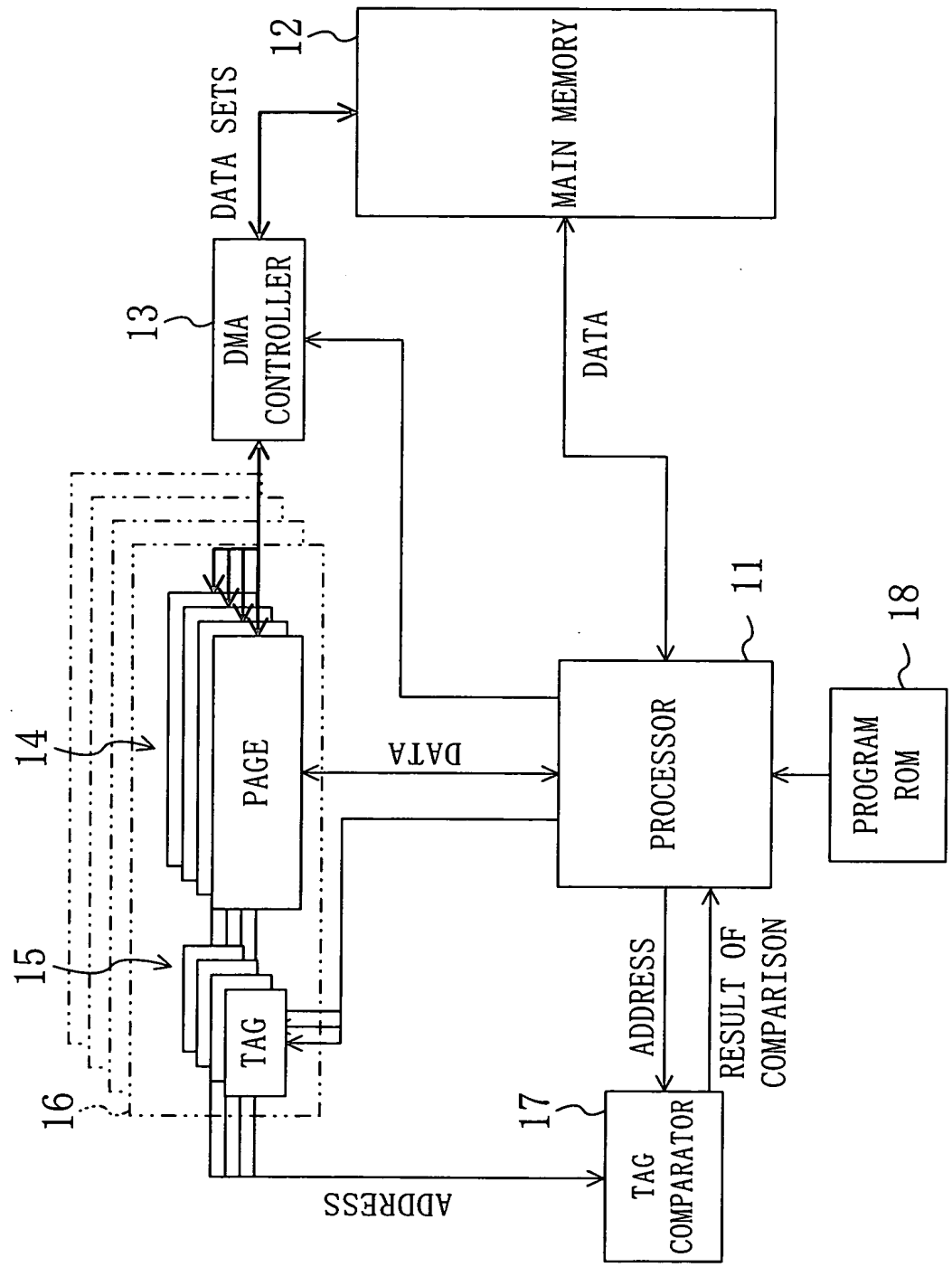

12
MAIN MEMORY
DATA SETS
13
DMA CONTROLLER
DATA
14
PAGE
DATA
11
PROCESSOR
18
PROGRAM ROM
15
TAG
ADDRESS
RESULT OF COMPARISON
16
17
TAG COMPARATOR
ADDRESS

FIG. 3

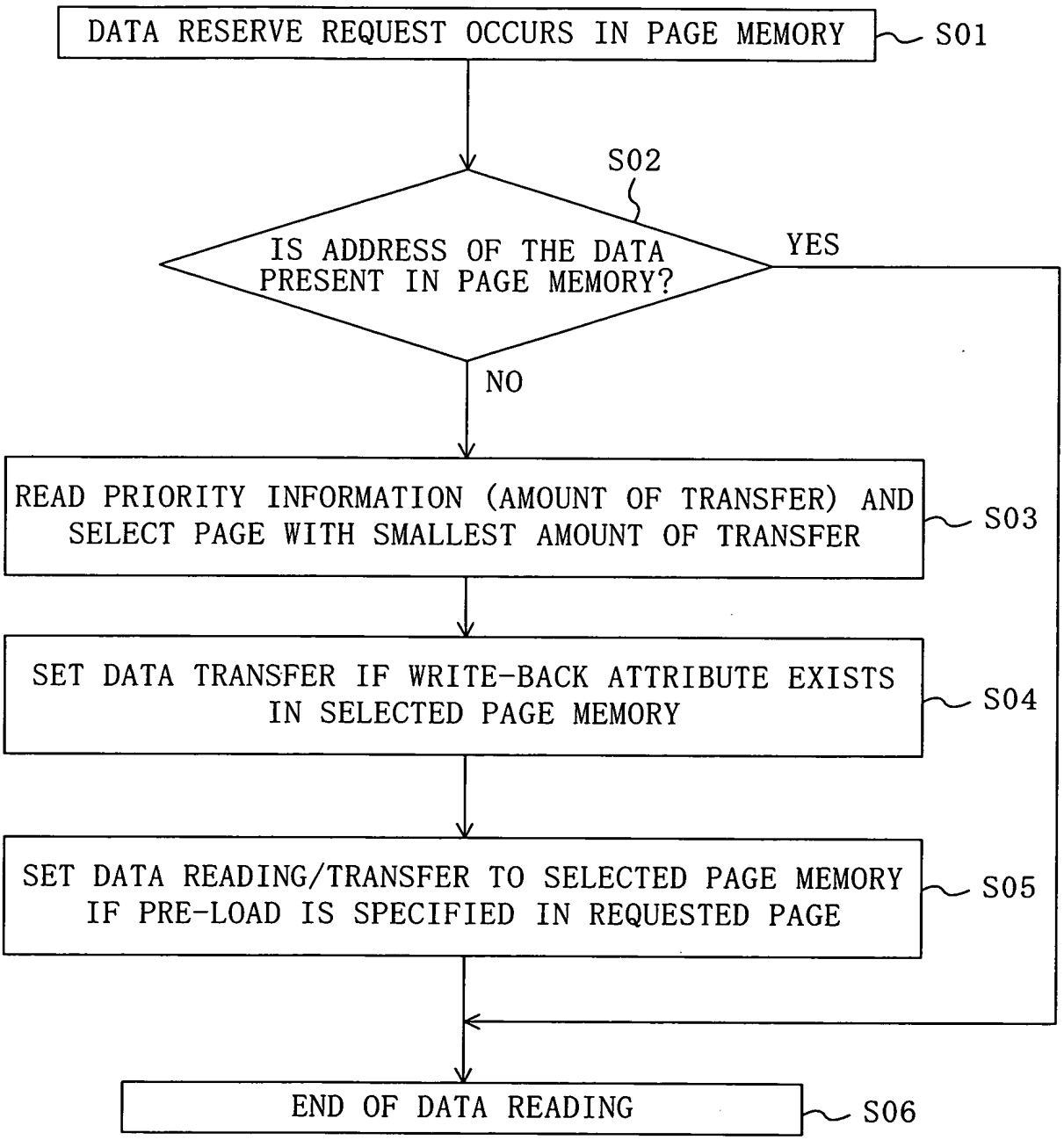

DATA RESERVE REQUEST OCCURS IN PAGE MEMORY
S01
S02
IS ADDRESS OF THE DATA PRESENT IN PAGE MEMORY?
YES
NO
READ PRIORITY INFORMATION (AMOUNT OF TRANSFER) AND SELECT PAGE WITH SMALLEST AMOUNT OF TRANSFER
S03
SET DATA TRANSFER IF WRITE-BACK ATTRIBUTE EXISTS IN SELECTED PAGE MEMORY
S04
SET DATA READING/TRANSFER TO SELECTED PAGE MEMORY IF PRE-LOAD IS SPECIFIED IN REQUESTED PAGE
S05
END OF DATA READING
S06

FIG. 4

WRITE-BACK ATTRIBUTE	PRE-LOAD ATTRIBUTE	WEIGHT
ABSENT	ABSENT	0
PRESENT	ABSENT	1
ABSENT	PRESENT	1
PRESENT	PRESENT	2

FIG. 5

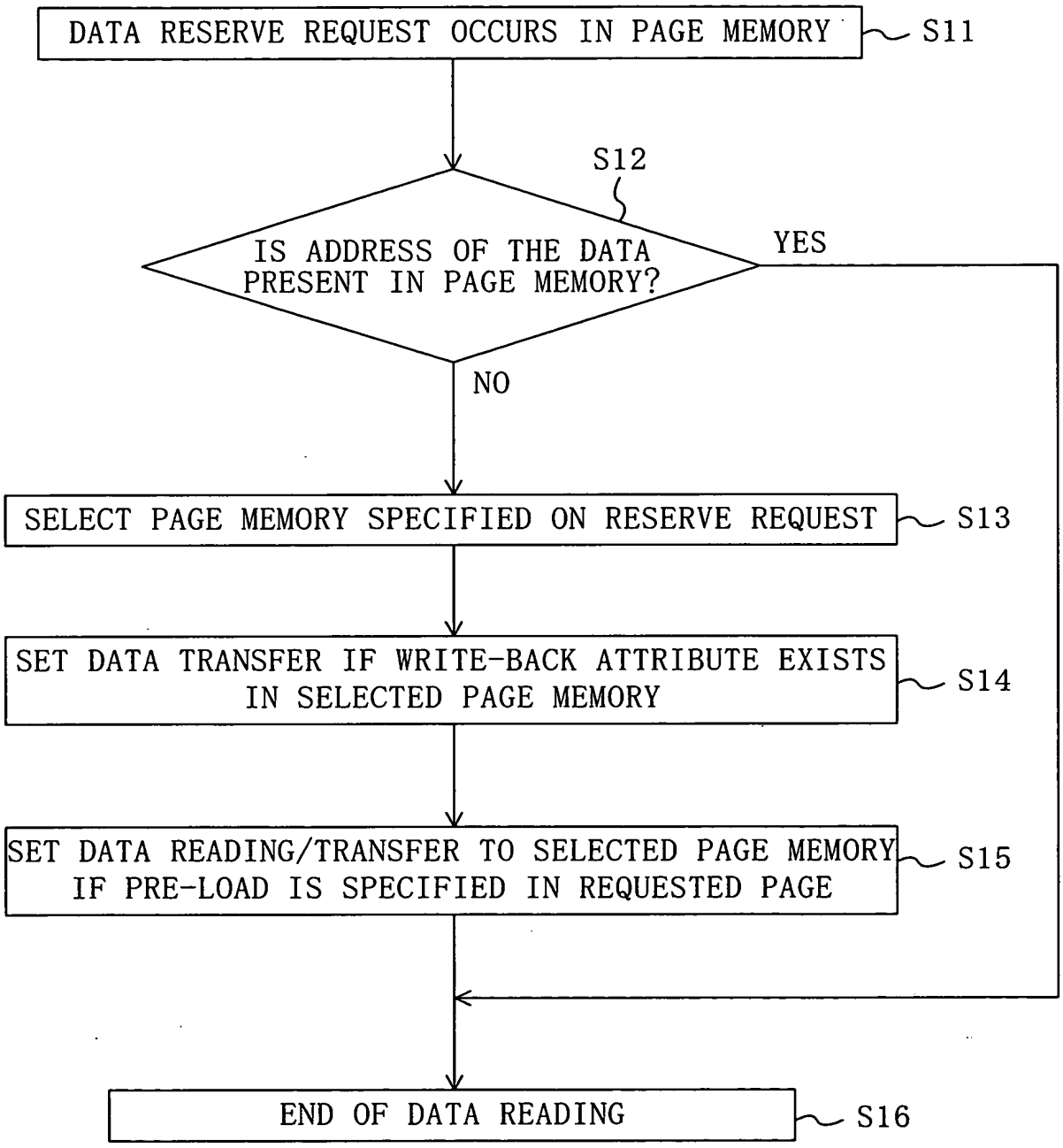

DATA RESERVE REQUEST OCCURS IN PAGE MEMORY
S11
S12
IS ADDRESS OF THE DATA PRESENT IN PAGE MEMORY?
YES
NO
SELECT PAGE MEMORY SPECIFIED ON RESERVE REQUEST
S13
SET DATA TRANSFER IF WRITE-BACK ATTRIBUTE EXISTS IN SELECTED PAGE MEMORY
S14
SET DATA READING/TRANSFER TO SELECTED PAGE MEMORY IF PRE-LOAD IS SPECIFIED IN REQUESTED PAGE
S15
END OF DATA READING
S16

FIG. 6

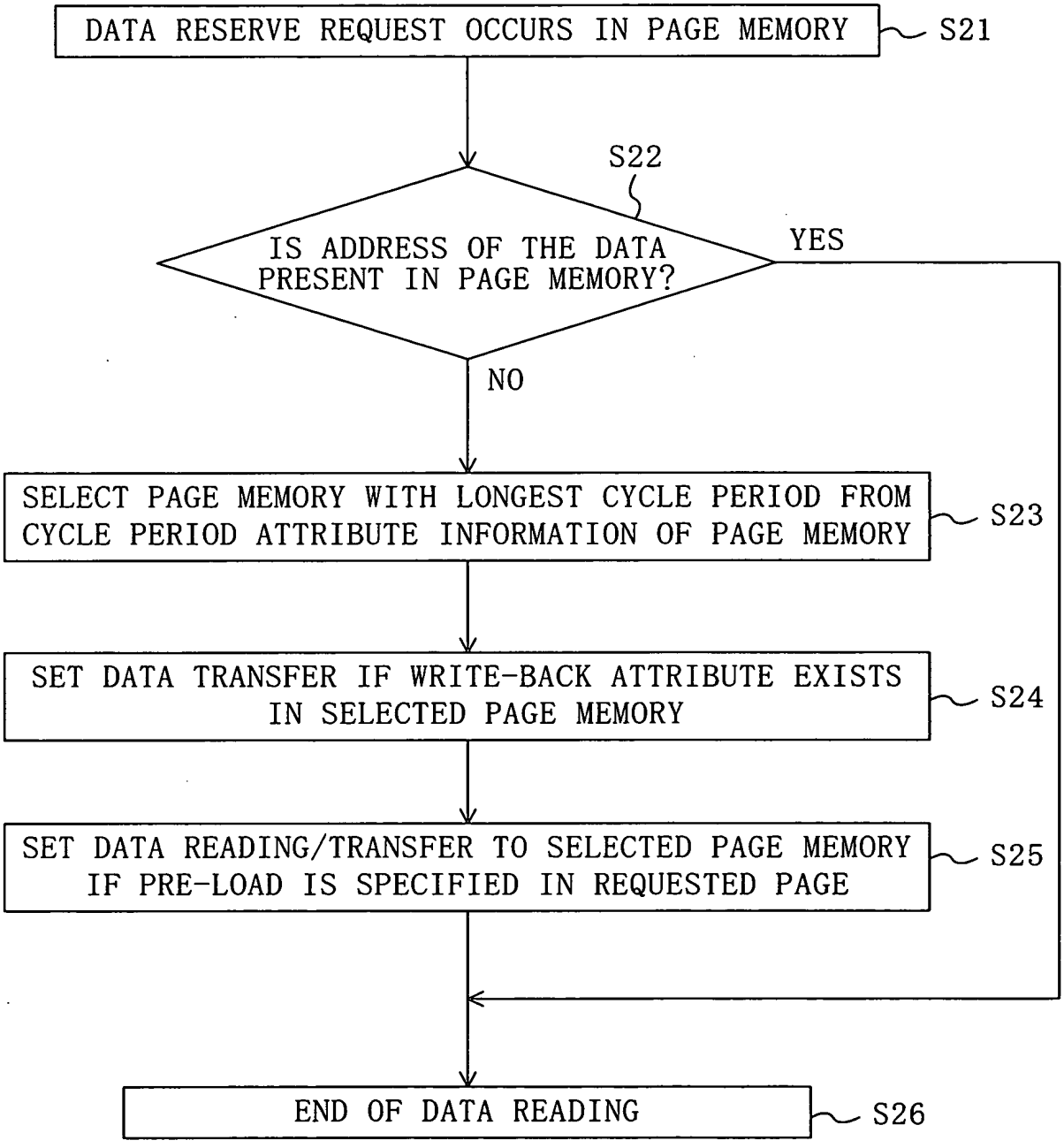

DATA RESERVE REQUEST OCCURS IN PAGE MEMORY
S21
S22
IS ADDRESS OF THE DATA PRESENT IN PAGE MEMORY?
YES
NO
SELECT PAGE MEMORY WITH LONGEST CYCLE PERIOD FROM CYCLE PERIOD ATTRIBUTE INFORMATION OF PAGE MEMORY
S23
SET DATA TRANSFER IF WRITE-BACK ATTRIBUTE EXISTS IN SELECTED PAGE MEMORY
S24
SET DATA READING/TRANSFER TO SELECTED PAGE MEMORY IF PRE-LOAD IS SPECIFIED IN REQUESTED PAGE
S25
END OF DATA READING
S26

FIG. 7A

・WHEN 10 MEMORIES EXIST

APPLICATION NAME	NUMBER OF ALLOCATED MEMORIES
APPLICATION(A)	4
APPLICATION(B)	3
APPLICATION(C)	3

EMPTY MEMORY REQUEST FROM APPLICATION (D)

FIG. 7B

APPLICATION NAME	NUMBER OF ALLOCATED MEMORIES
APPLICATION(A)	3
APPLICATION(B)	3
APPLICATION(C)	2
APPLICATION(D)	2

FIG. 8

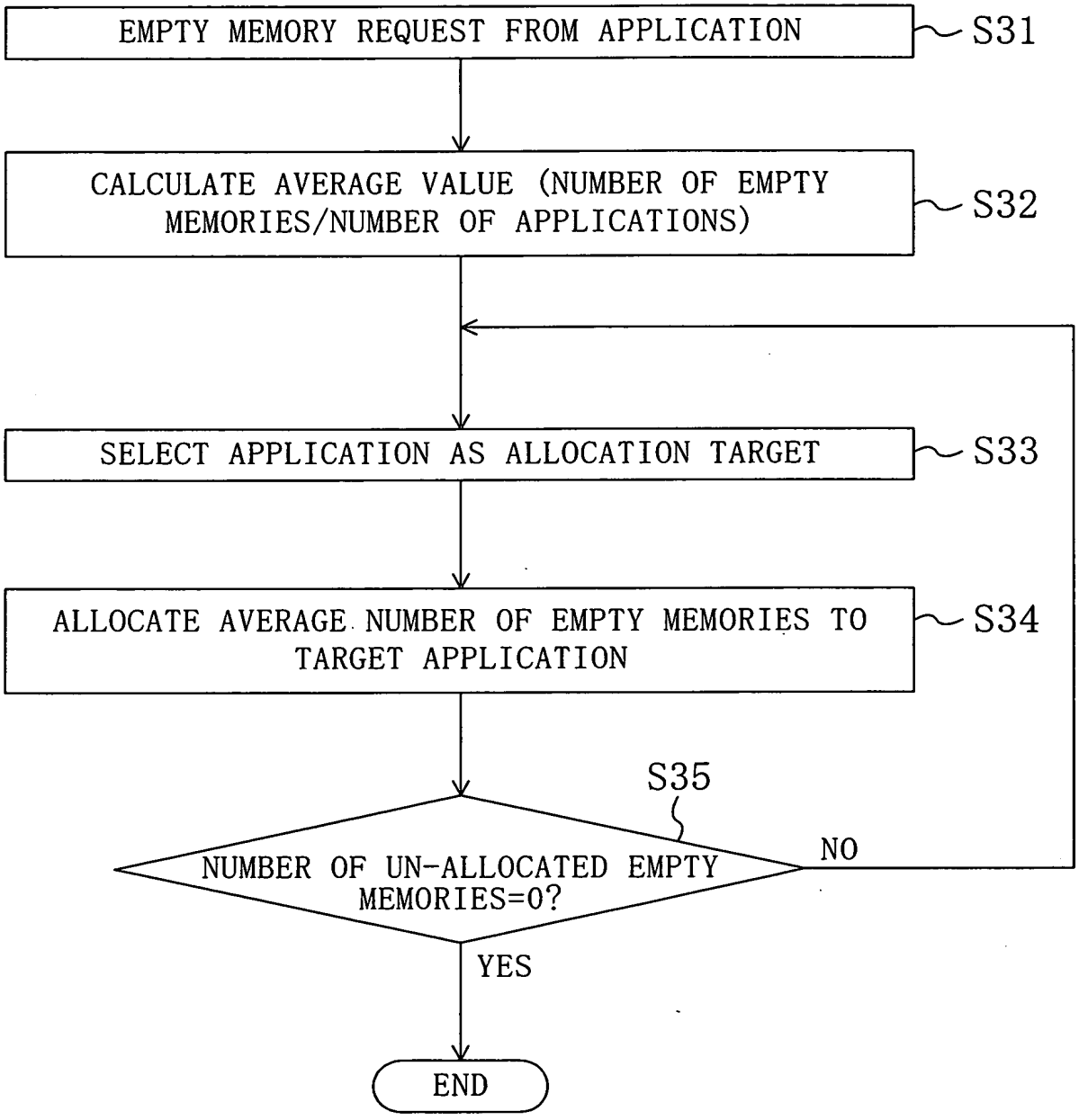

EMPTY MEMORY REQUEST FROM APPLICATION
S31
CALCULATE AVERAGE VALUE (NUMBER OF EMPTY MEMORIES/NUMBER OF APPLICATIONS)
S32
SELECT APPLICATION AS ALLOCATION TARGET
S33
ALLOCATE AVERAGE NUMBER OF EMPTY MEMORIES TO TARGET APPLICATION
S34
S35
NUMBER OF UN-ALLOCATED EMPTY MEMORIES=0?
NO
YES
END

FIG. 9A

・WHEN 10 MEMORIES EXIST

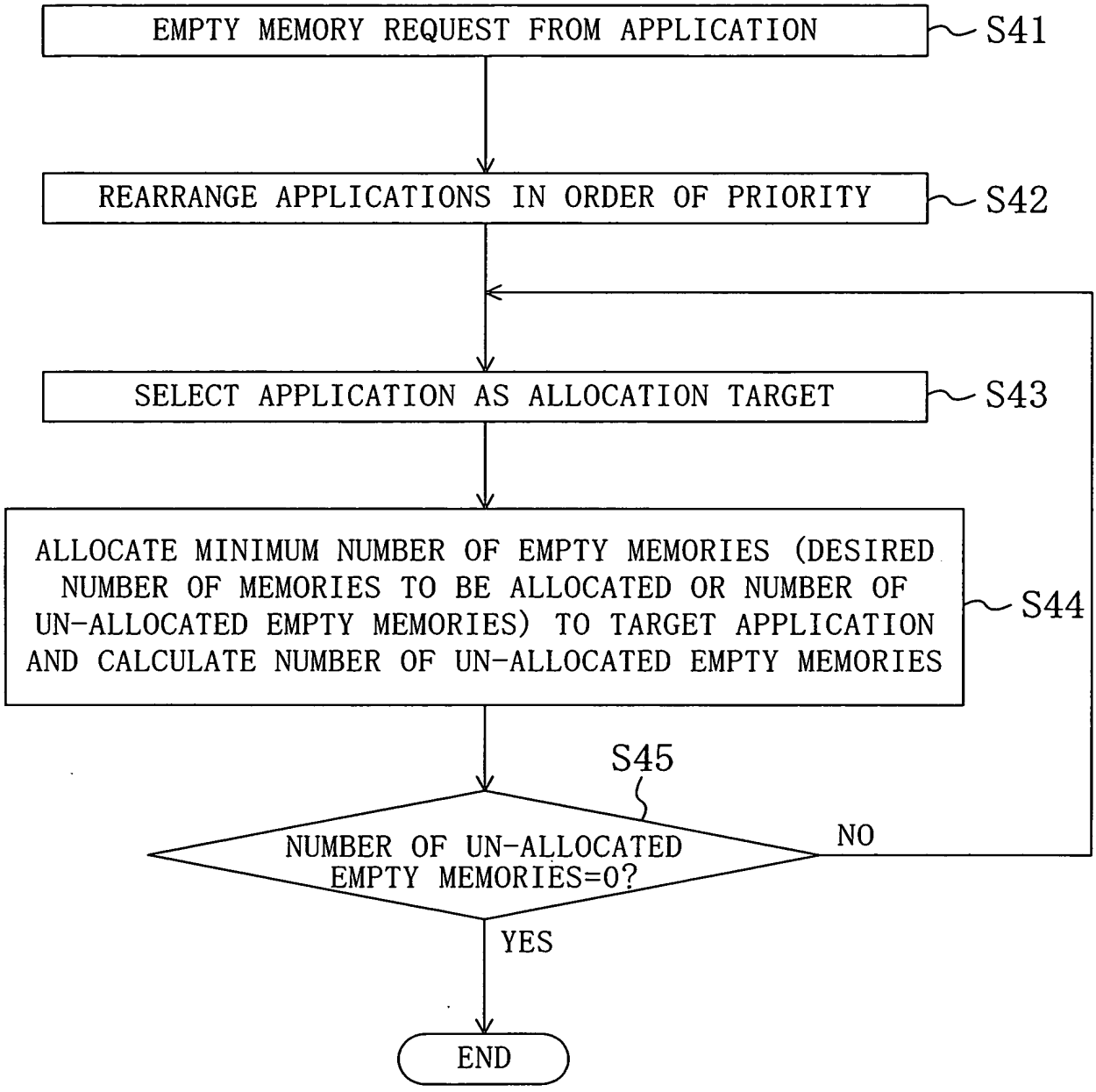
APPLICATION NAME	PRIORITY	DESIRED NUMBER OF MEMORIES	NUMBER OF ALLOCATED MEMORIES
APPLICATION (A)	1	4	4
APPLICATION (B)	2	4	4
APPLICATION (C)	3	4	2

EMPTY MEMORY REQUEST FROM APPLICATION (D)

FIG. 9B

APPLICATION NAME	PRIORITY	DESIRED NUMBER OF MEMORIES	NUMBER OF ALLOCATED MEMORIES
APPLICATION (A)	1	4	4
APPLICATION (D)	1	4	4
APPLICATION (B)	2	4	2
APPLICATION (C)	3	4	0

FIG. 10


EMPTY MEMORY REQUEST FROM APPLICATION
S41
REARRANGE APPLICATIONS IN ORDER OF PRIORITY
S42
SELECT APPLICATION AS ALLOCATION TARGET
S43
ALLOCATE MINIMUM NUMBER OF EMPTY MEMORIES (DESIRED NUMBER OF MEMORIES TO BE ALLOCATED OR NUMBER OF UN-ALLOCATED EMPTY MEMORIES) TO TARGET APPLICATION AND CALCULATE NUMBER OF UN-ALLOCATED EMPTY MEMORIES
S44
S45
NUMBER OF UN-ALLOCATED EMPTY MEMORIES=0?
NO
YES
END

・WHEN 10 MEMORIES EXIST

FIG. 11A

APPLICATION NAME	OPERATION CYCLE[ms]	DESIRED NUMBER OF MEMORIES	NUMBER OF ALLOCATED MEMORIES
APPLICATION (A)	20	4	4
APPLICATION (B)	30	4	4
APPLICATION (C)	60	4	2

EMPTY MEMORY REQUEST FROM APPLICATION (D)

FIG. 11B

APPLICATION NAME	OPERATION CYCLE[ms]	DESIRED NUMBER OF MEMORIES	NUMBER OF ALLOCATED MEMORIES
APPLICATION (A)	20	4	4
APPLICATION (D)	20	4	4
APPLICATION (B)	30	4	2
APPLICATION (C)	60	4	0

FIG. 12

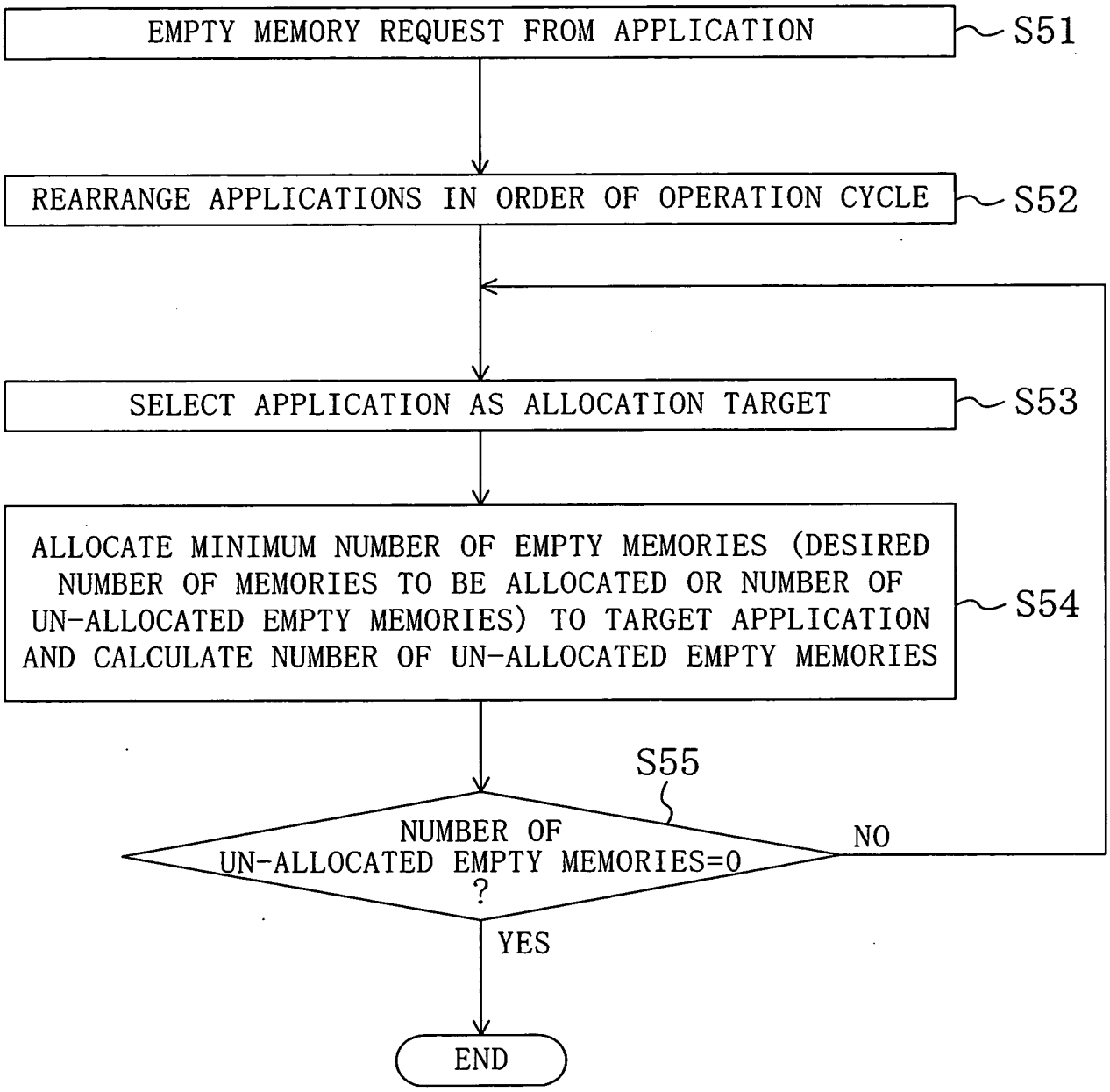

EMPTY MEMORY REQUEST FROM APPLICATION
S51
REARRANGE APPLICATIONS IN ORDER OF OPERATION CYCLE
S52
SELECT APPLICATION AS ALLOCATION TARGET
S53
ALLOCATE MINIMUM NUMBER OF EMPTY MEMORIES (DESIRED NUMBER OF MEMORIES TO BE ALLOCATED OR NUMBER OF UN-ALLOCATED EMPTY MEMORIES) TO TARGET APPLICATION AND CALCULATE NUMBER OF UN-ALLOCATED EMPTY MEMORIES
S54
S55
NUMBER OF UN-ALLOCATED EMPTY MEMORIES=0 ?
NO
YES
END

FIG. 13A

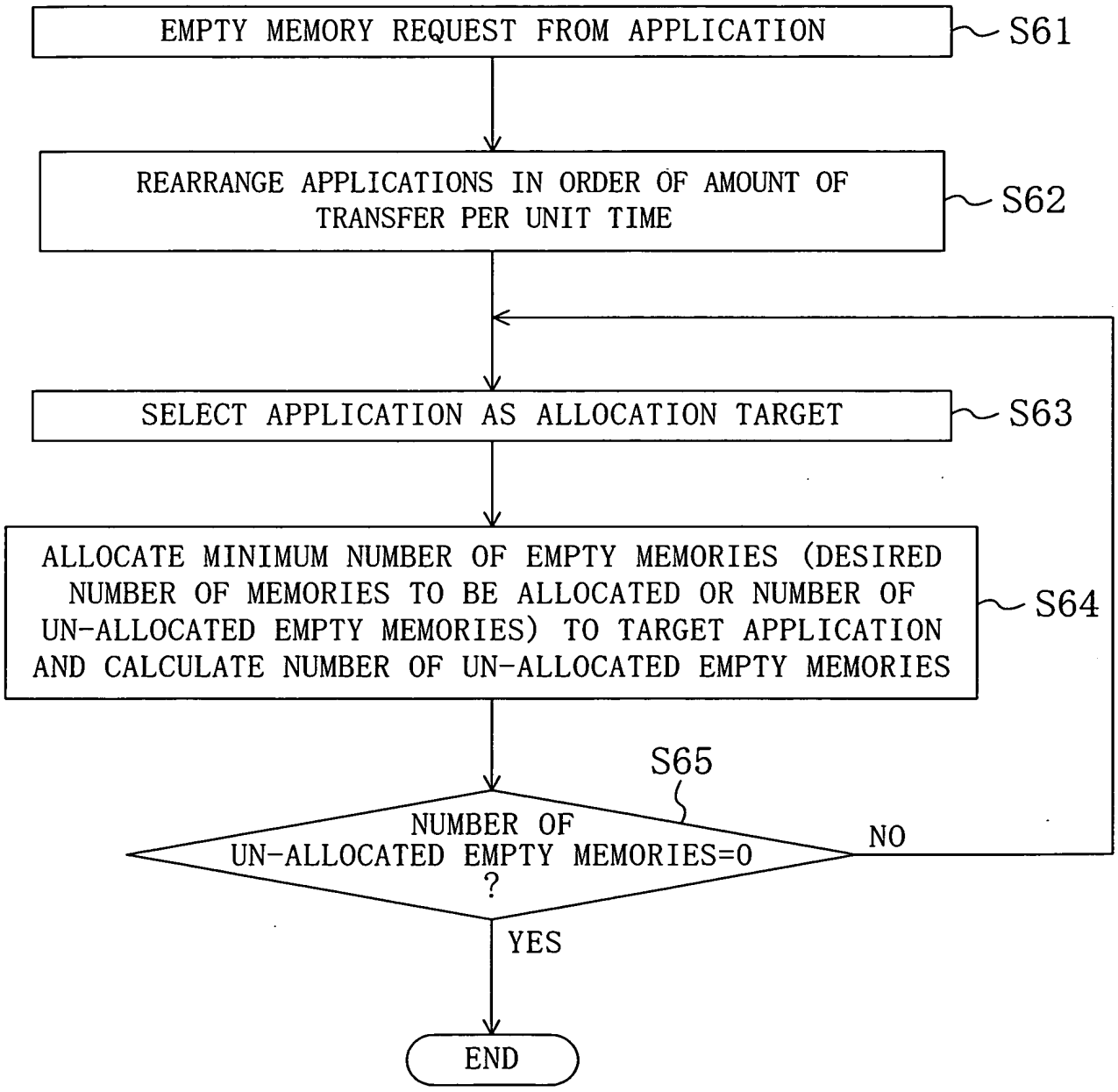
APPLICATION NAME	AMOUNT OF INFORMATION TRANSFERRED PER UNIT TIME	NUMBER OF ALLOCATED MEMORIES	NUMBER OF ACQUIRED MEMORIES
APPLICATION (A)	20	4	4
APPLICATION (B)	30	4	4
APPLICATION (C)	60	4	2

EMPTY MEMORY REQUEST FROM APPLICATION (D)

FIG. 13B

APPLICATION NAME	AMOUNT OF INFORMATION TRANSFERRED PER UNIT TIME	DESIRED NUMBER OF MEMORIES	NUMBER OF ACQUIRED MEMORIES
APPLICATION (A)	20	4	4
APPLICATION (D)	20	4	4
APPLICATION (B)	30	4	2
APPLICATION (C)	60	4	0

FIG. 14


EMPTY MEMORY REQUEST FROM APPLICATION
S61
REARRANGE APPLICATIONS IN ORDER OF AMOUNT OF TRANSFER PER UNIT TIME
S62
SELECT APPLICATION AS ALLOCATION TARGET
S63
ALLOCATE MINIMUM NUMBER OF EMPTY MEMORIES (DESIRED NUMBER OF MEMORIES TO BE ALLOCATED OR NUMBER OF UN-ALLOCATED EMPTY MEMORIES) TO TARGET APPLICATION AND CALCULATE NUMBER OF UN-ALLOCATED EMPTY MEMORIES
S64
S65
NUMBER OF UN-ALLOCATED EMPTY MEMORIES=0 ?
NO
YES
END

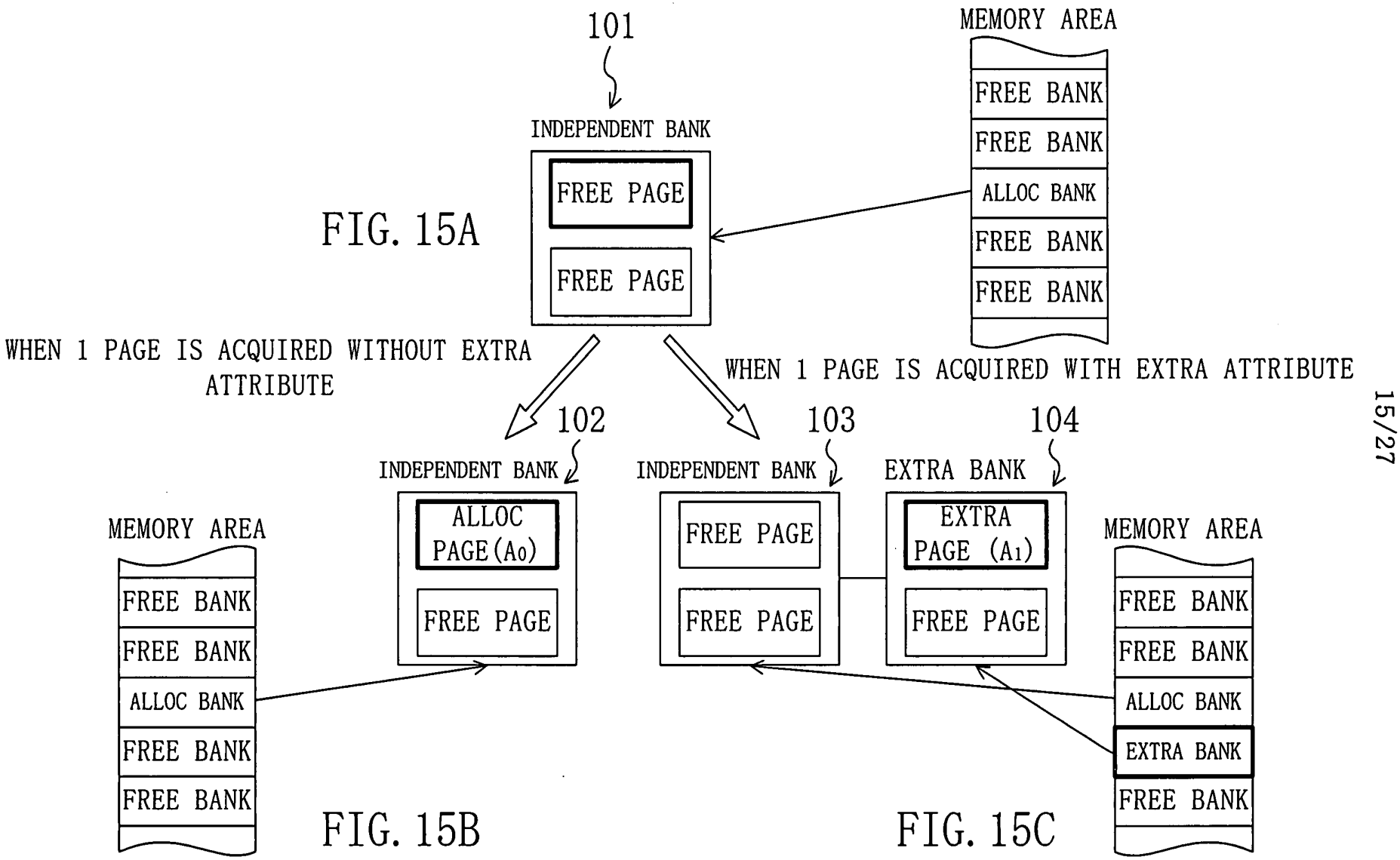
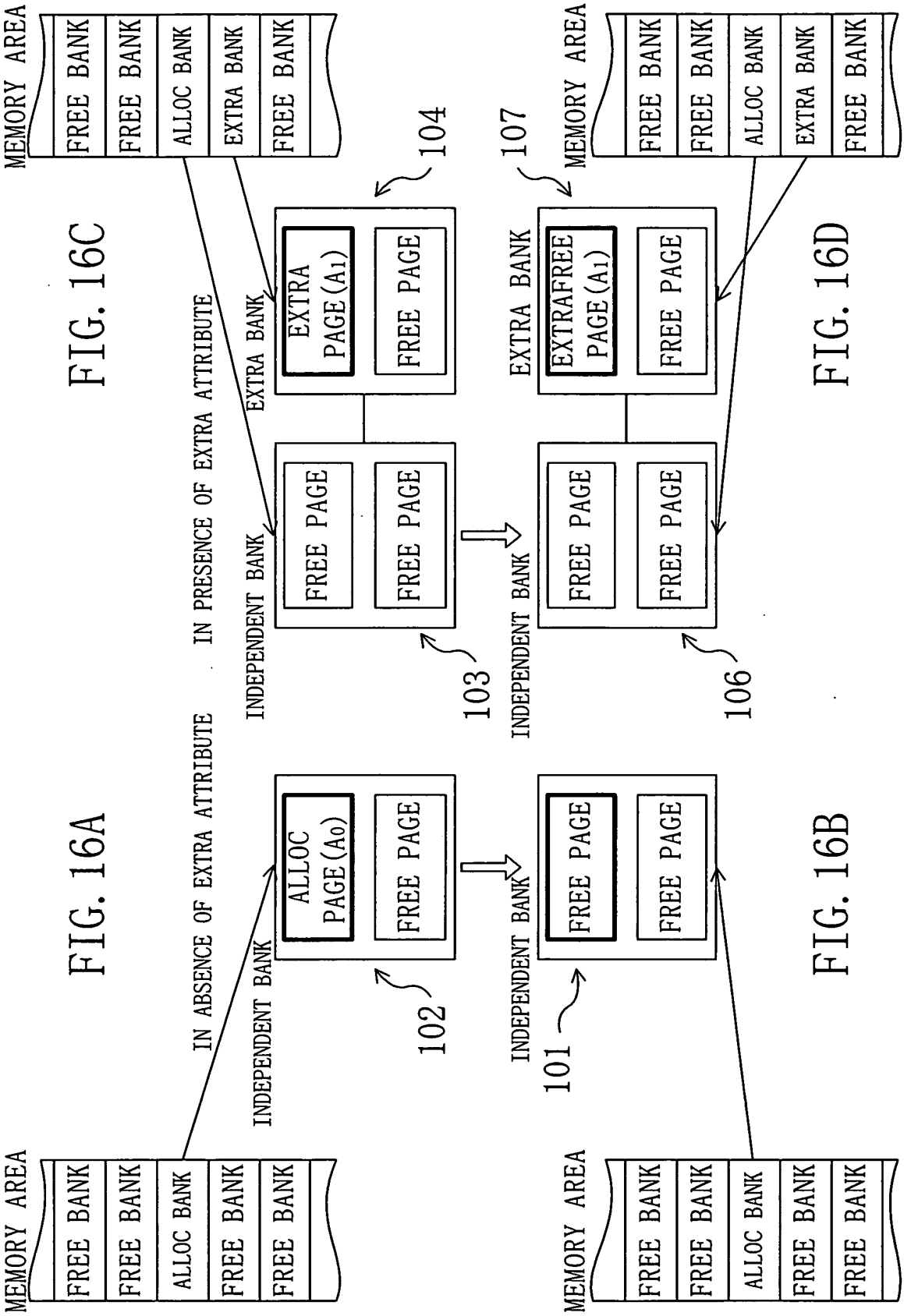
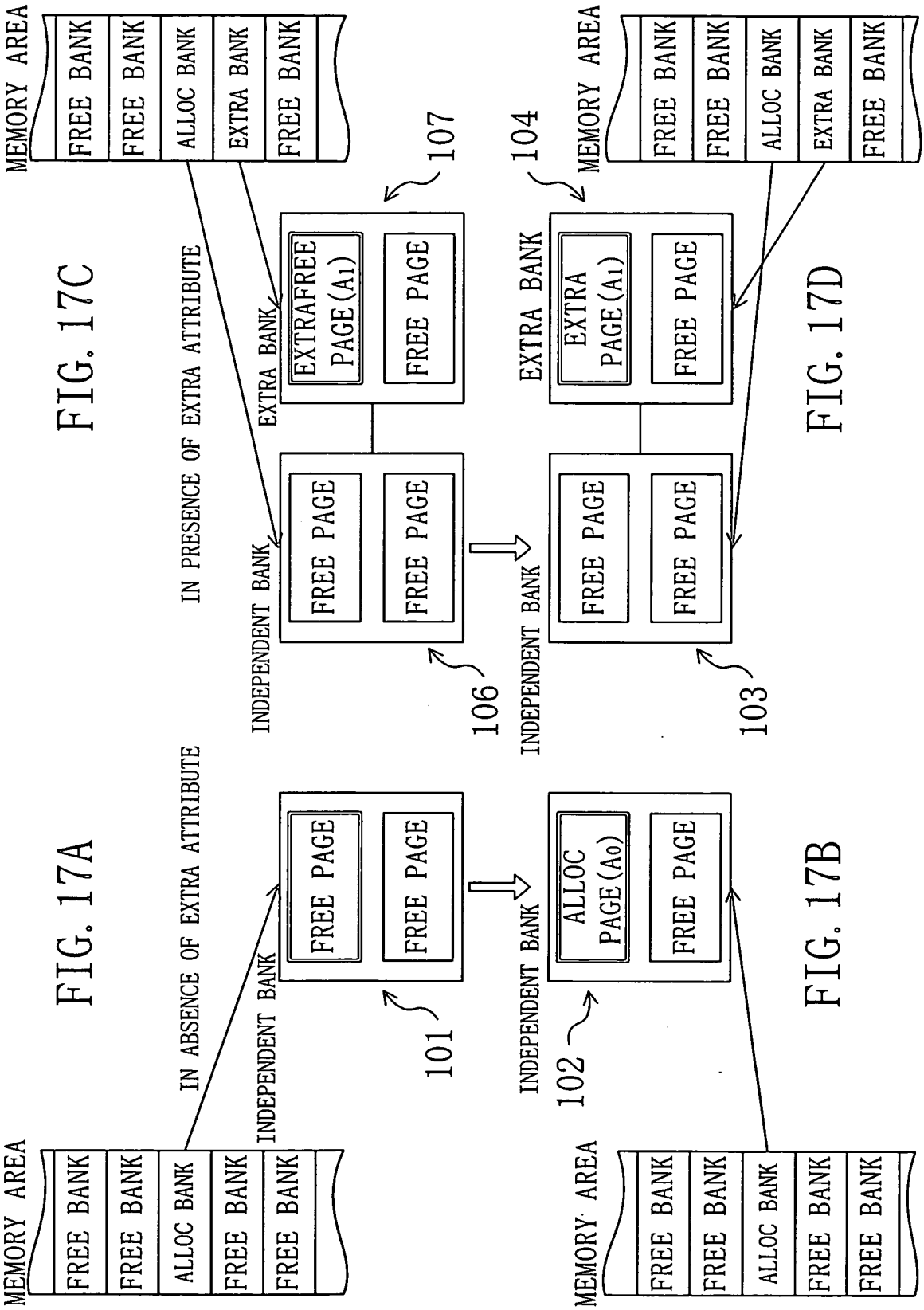


FIG. 15A

FIG. 15B

FIG. 15C


MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
FREE BANK
FREE BANK
IN ABSENCE OF EXTRA ATTRIBUTE
INDEPENDENT BANK
ALLOC PAGE(A0)
FREE PAGE
102
INDEPENDENT BANK
FREE PAGE
FREE PAGE
101
FIG. 16A
FIG. 16B
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
IN PRESENCE OF EXTRA ATTRIBUTE
EXTRA BANK
EXTRA PAGE(A1)
FREE PAGE
104
INDEPENDENT BANK
FREE PAGE
FREE PAGE
103
FIG. 16C
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
107
EXTRA BANK
EXTRAFREE PAGE(A1)
FREE PAGE
INDEPENDENT BANK
FREE PAGE
FREE PAGE
106
FIG. 16D


MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
FREE BANK
FREE BANK
IN ABSENCE OF EXTRA ATTRIBUTE
INDEPENDENT BANK
FREE PAGE
FREE PAGE
101
INDEPENDENT BANK
ALLOC PAGE(A0)
FREE PAGE
102
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
FREE BANK
FREE BANK
FIG. 17A
FIG. 17B
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
IN PRESENCE OF EXTRA ATTRIBUTE
EXTRA BANK
EXTRAFREE PAGE(A1)
FREE PAGE
107
INDEPENDENT BANK
FREE PAGE
FREE PAGE
106
INDEPENDENT BANK
FREE PAGE
FREE PAGE
103
EXTRA BANK
EXTRA PAGE(A1)
FREE PAGE
104
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
FIG. 17C
FIG. 17D

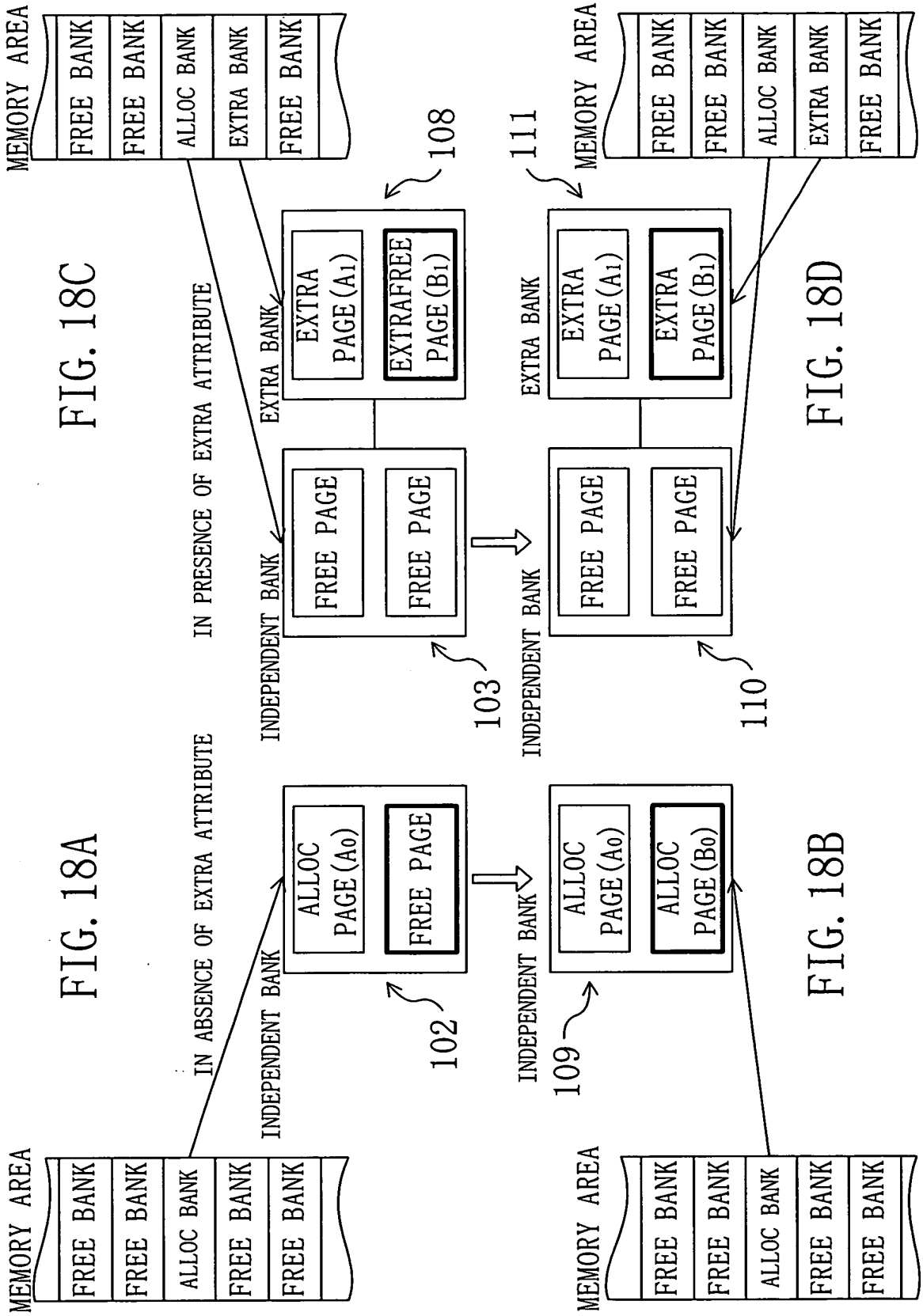

MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
FREE BANK
FREE BANK
IN ABSENCE OF EXTRA ATTRIBUTE
INDEPENDENT BANK
ALLOC PAGE (A0)
FREE PAGE
102
INDEPENDENT BANK
ALLOC PAGE (A0)
ALLOC PAGE (B0)
109
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
FREE BANK
FREE BANK
FIG. 18A
FIG. 18B
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
IN PRESENCE OF EXTRA ATTRIBUTE
EXTRA BANK
EXTRA PAGE (A1)
EXTRAFREE PAGE (B1)
108
INDEPENDENT BANK
FREE PAGE
FREE PAGE
103
MEMORY AREA
FREE BANK
FREE BANK
ALLOC BANK
EXTRA BANK
FREE BANK
111
EXTRA BANK
EXTRA PAGE (A1)
EXTRA PAGE (B1)
INDEPENDENT BANK
FREE PAGE
FREE PAGE
110
FIG. 18C
FIG. 18D

FIG. 19A

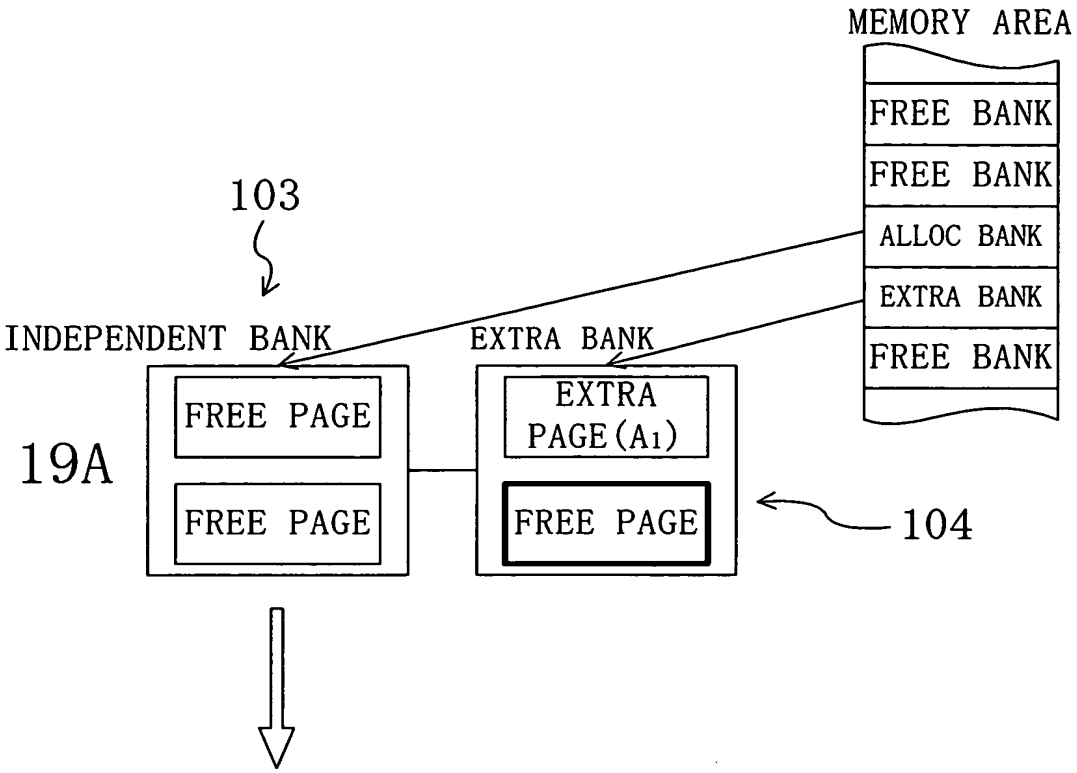


FIG. 19B

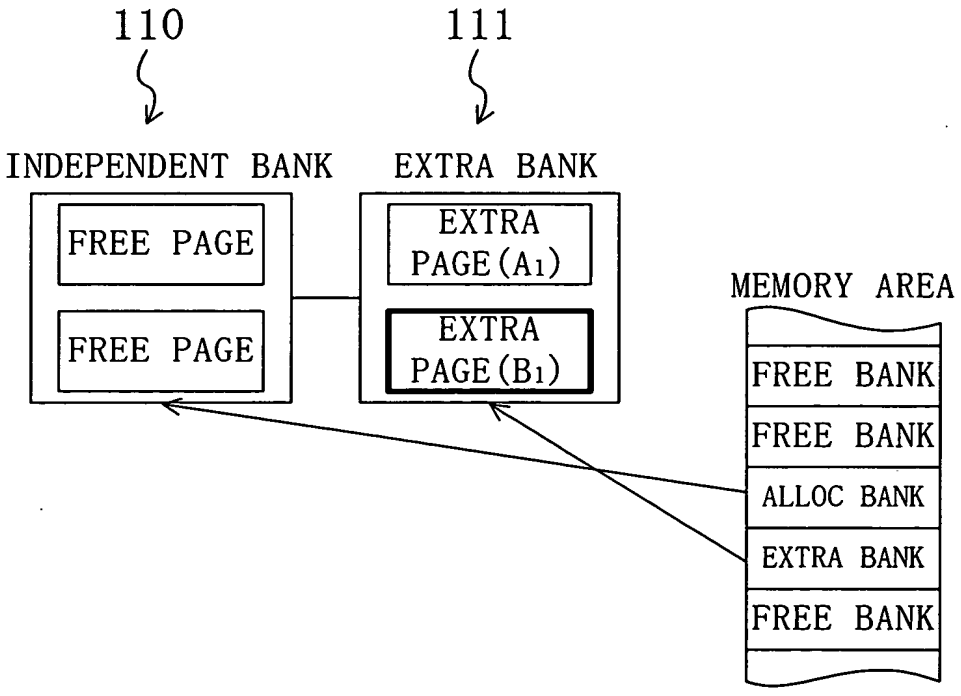


FIG. 20A

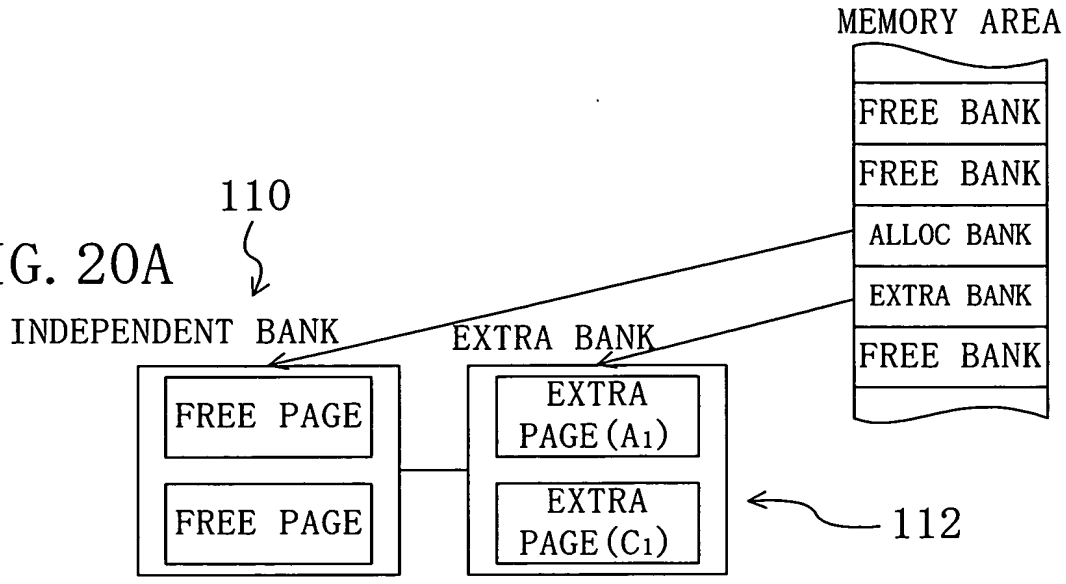


FIG. 20B

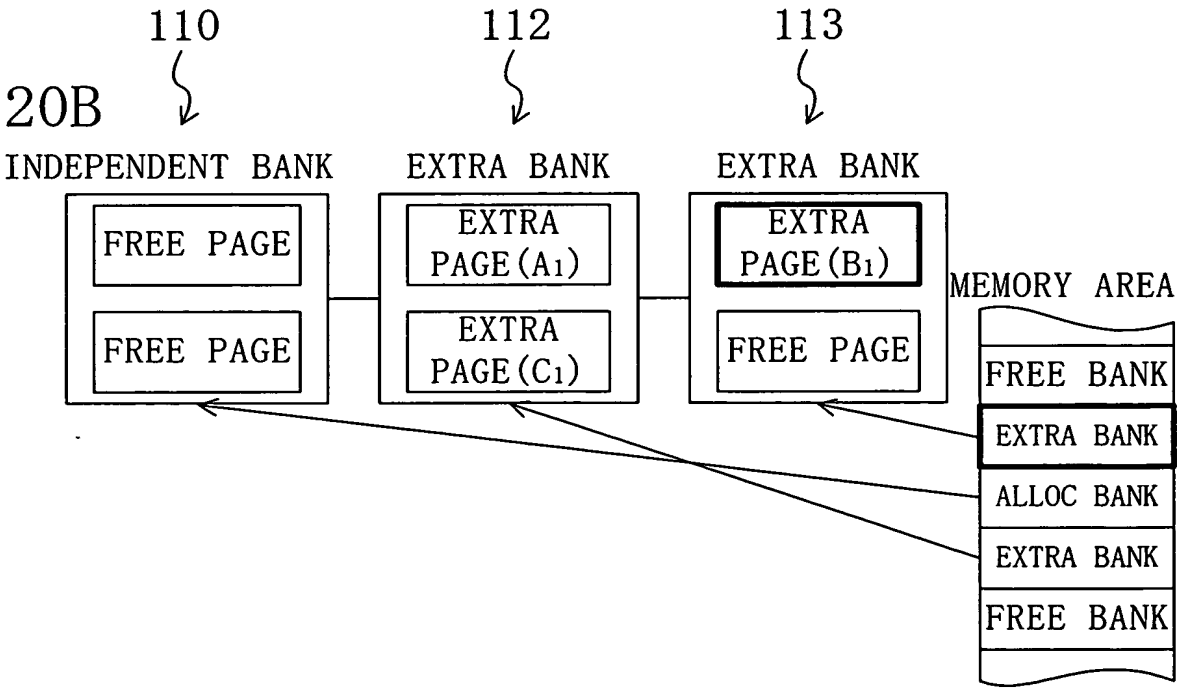


FIG. 21A

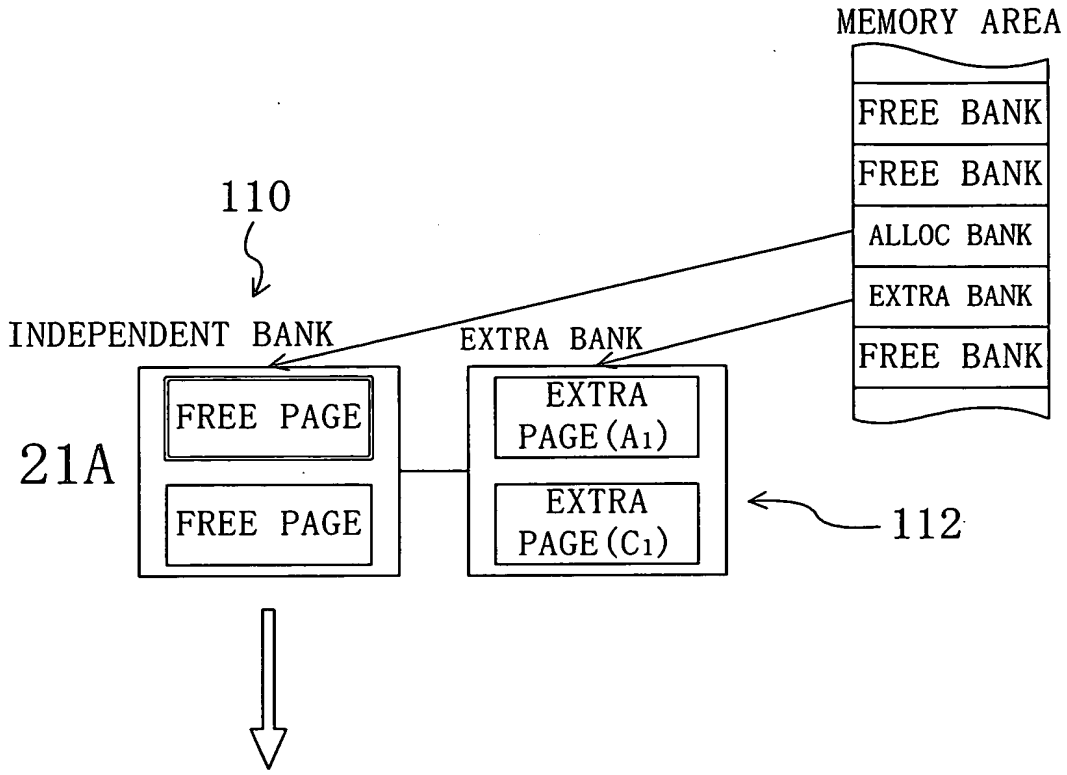


FIG. 21B

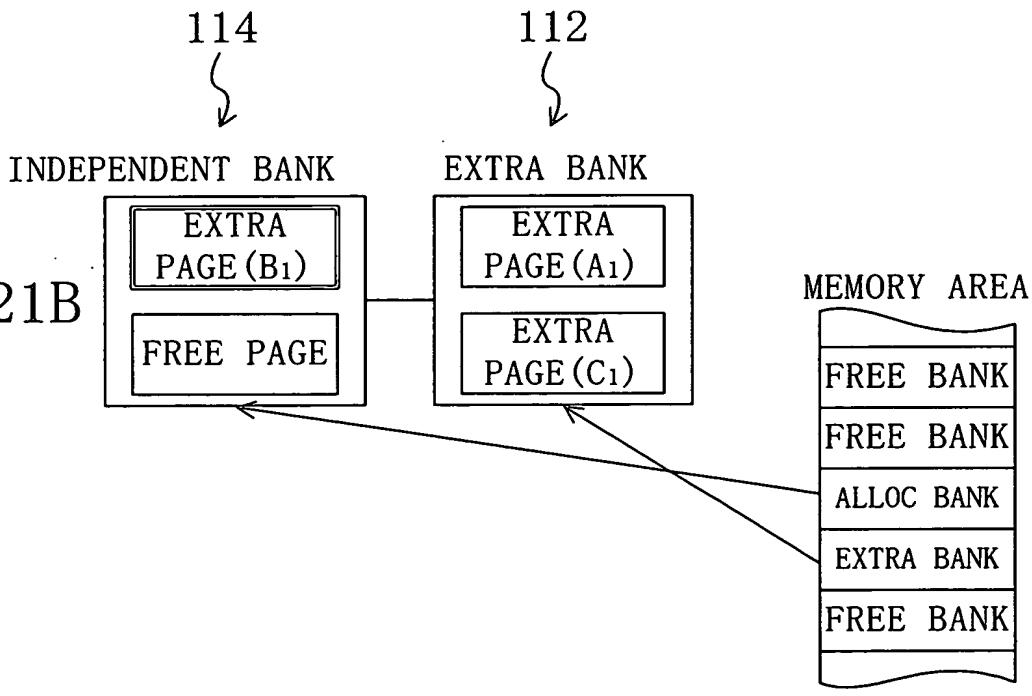


FIG. 22

	[A]	[B]	[C]	[D]
[1]	1	2	3	—
[2]	—	—	4	7
[3]	—	—	5	—
[4]	—	—	6	—
[5]	—	8	—	—

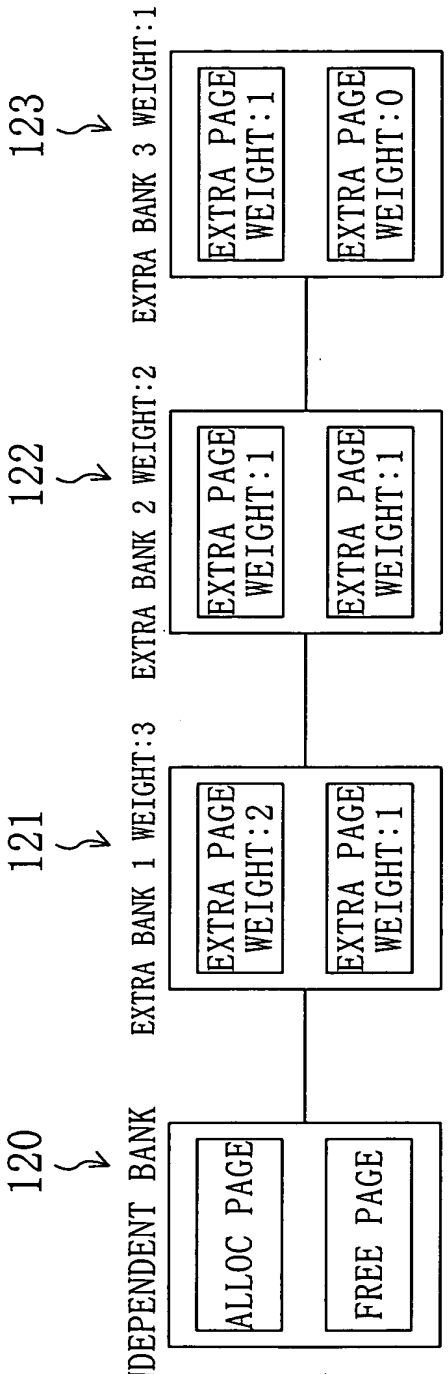


FIG. 23A

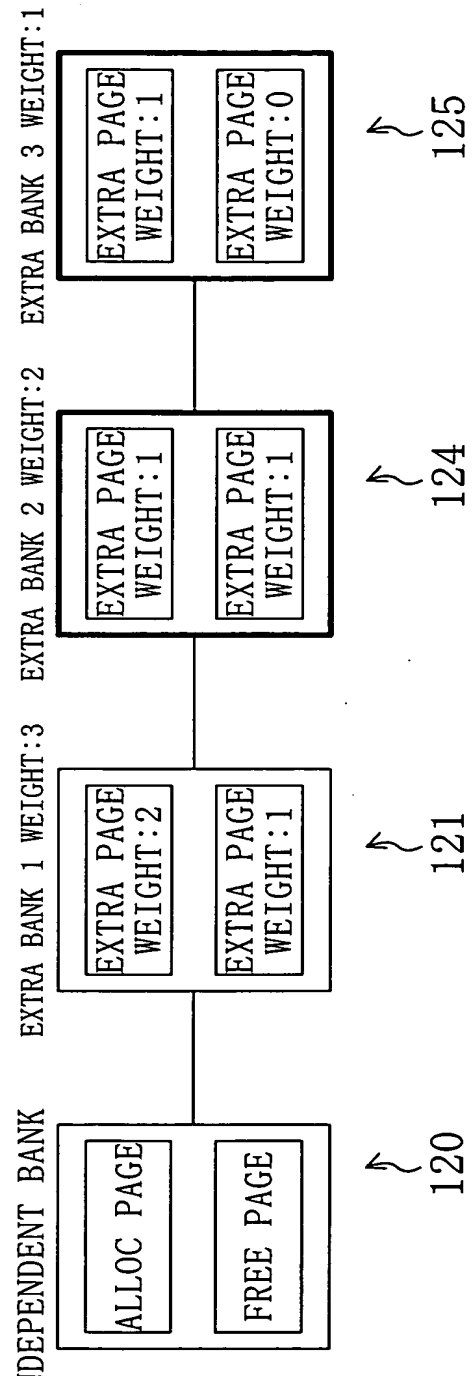


FIG. 23B

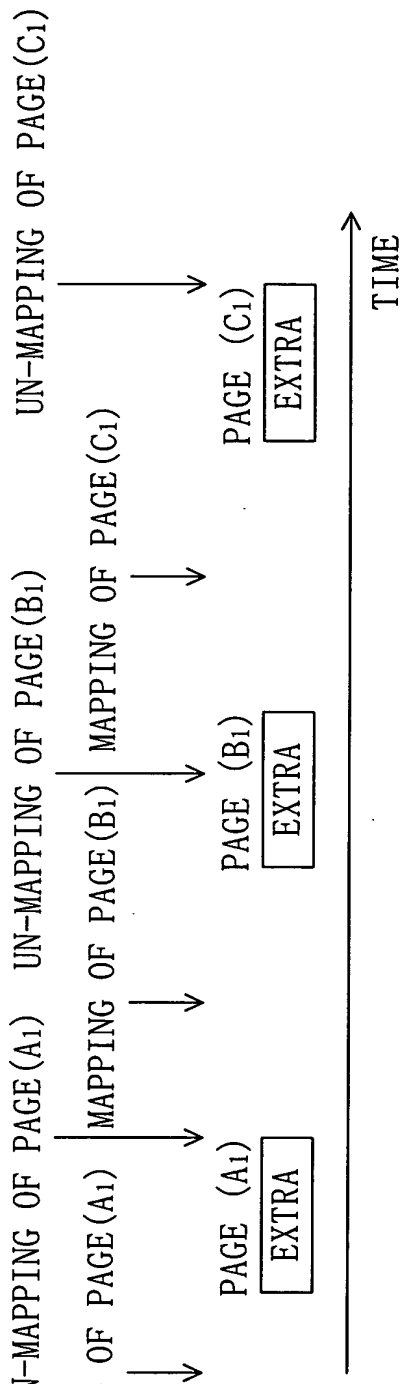


FIG. 24A

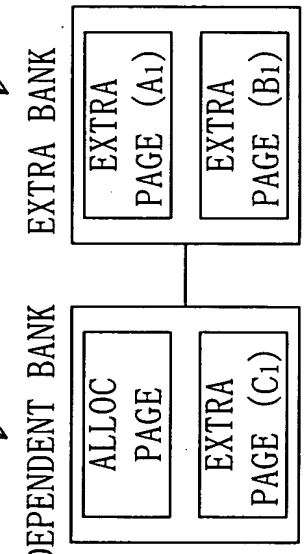


FIG. 24B

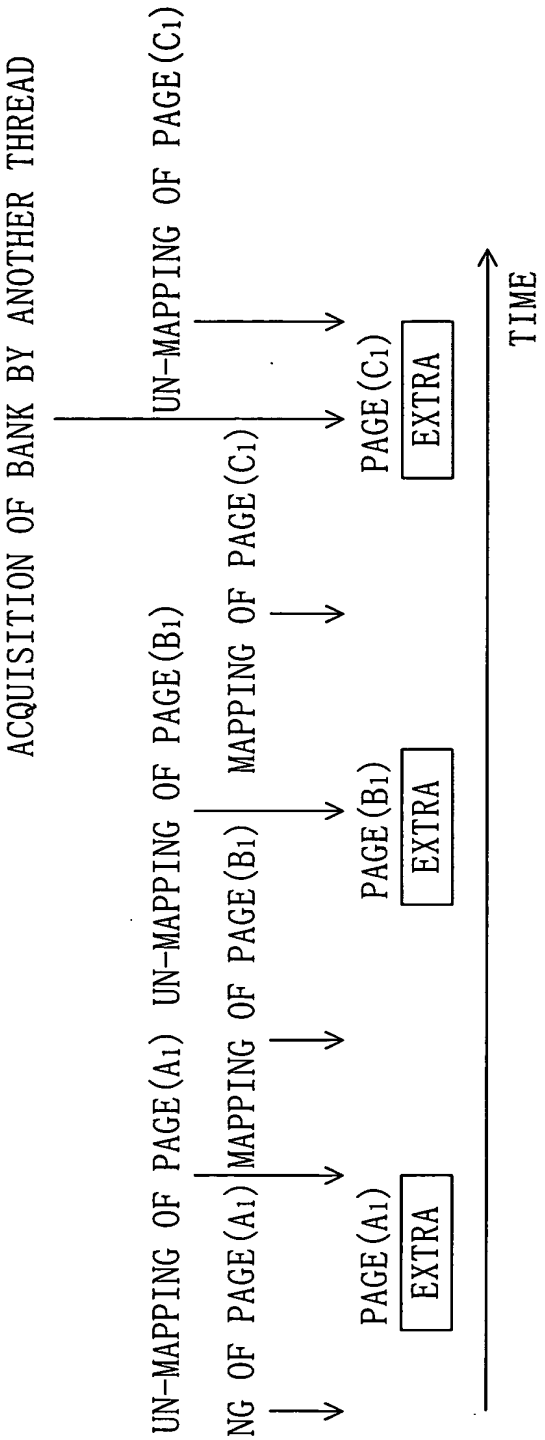


FIG. 25A

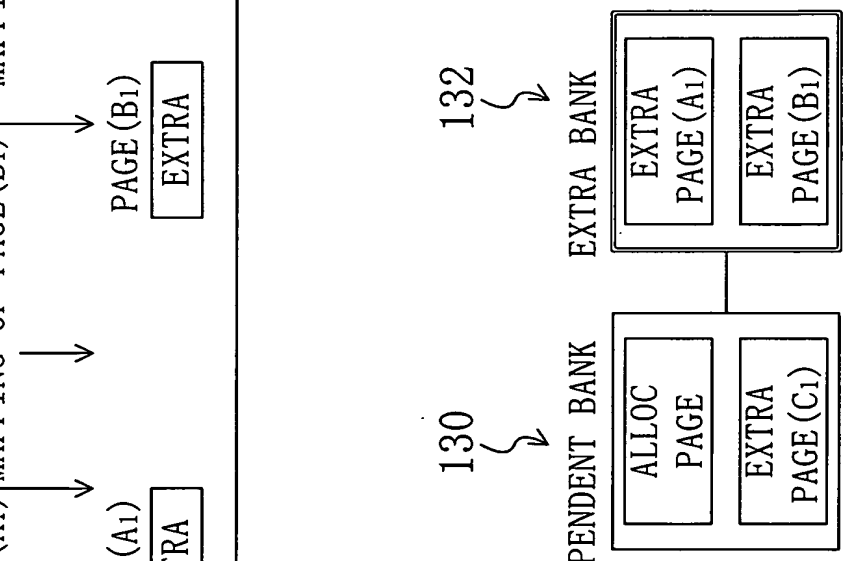


FIG. 25B

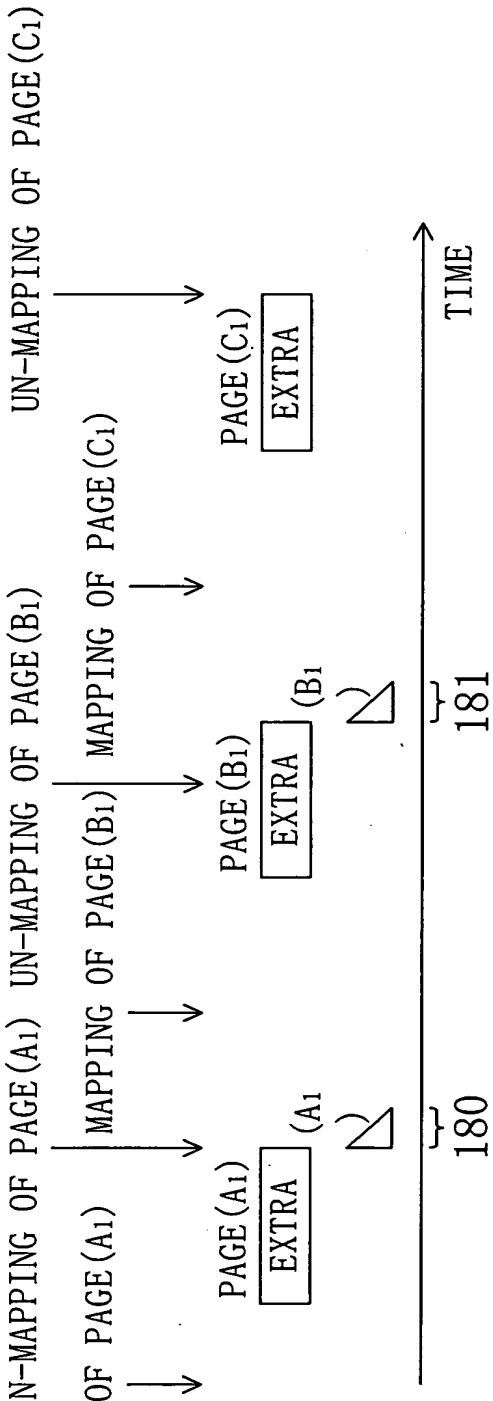


FIG. 26A

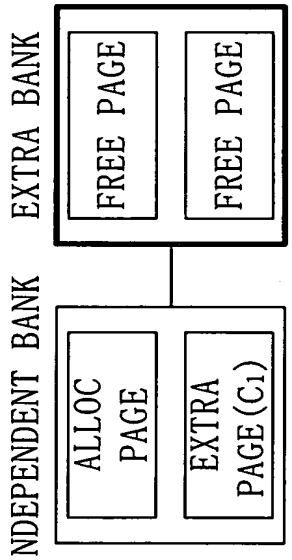


FIG. 26B

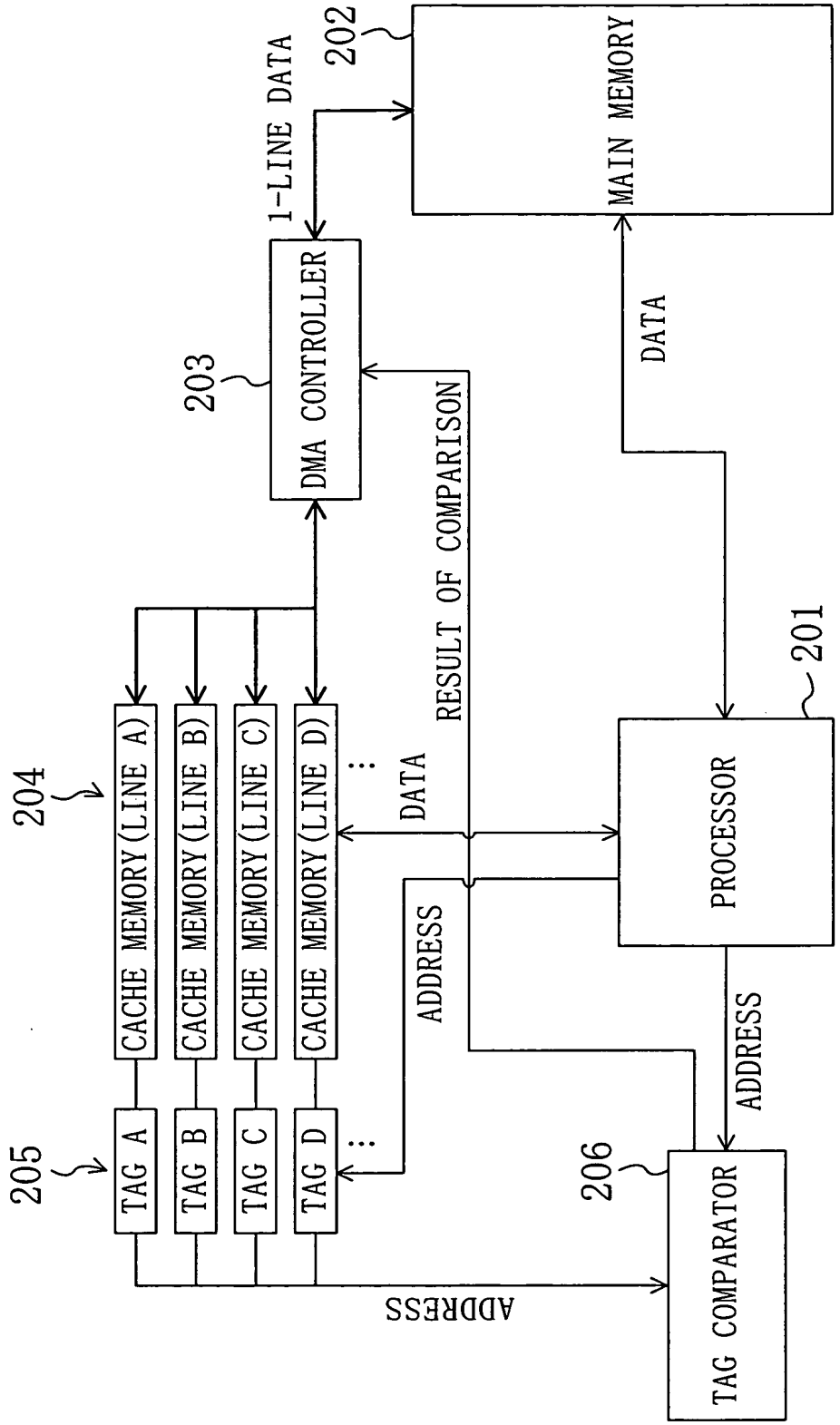



FIG. 27
PRIOR ART